

Combination of product quality management and exports:

The case of Colombian fruits companies.

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Thesis Submitted to the Degree of BIBA

Montpellier Business School

May 2015

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I. Abstract

Quality management provides to companies a framework to improve quality in overall systems, reduction of costs, reallocation of resources efficiently, correct planning of strategies, prevent or correct errors in the right time and increase the performance of companies. In this text, we discuss the different theories in this field, their obligatory or non-obligatory compliance, the importance of quality management for exporting companies and a case study of a Colombian firm that its main objective is to manage quality. In conclusion, we find out that there is different types of quality management systems such as Juran's trilogy, Deming 14 points, Six sigma, HACCP, and so on; also that companies have to manage suppliers and that quality has a positive influence on exports volume; in the case of Colombian small and medium enterprises, it can be mentioned that the majority has implemented tools regarding quality management but is not enough.

II. Introduction*

International trade is understood as the exchange of goods and services between individuals or legal persons of two or more countries, this exchange brings origin to the exit and entry of merchandise from one country to another – exports and imports – with the objective of satisfying customers and other stakeholders necessities, earn utilities and be a source for the socio-economic development of an specific country (Daneshjo, 2014).

Nowadays, public and private actors around the world promote exports and more over in developing countries. Actors in countries like Colombia implement programs – in each sector of his economy – to enhance the competitiveness internationally by giving companies a guideline to increase their productivity and efficacy, and additionally giving them the basis and recommendations to enter into international markets. Nevertheless, companies have to take the initiative to participate actively on these programs.

One of the most important sectors in Colombia that contributes to the economic and social development is, fruits and vegetables sector; Colombia is well-known for being a tropical country that has the advantage of have weather and ground conditions that let him produce all 12 months

of the year; these advantages facilitate and allow to supply the national market and looking forward to the international market. In spite of having an average growth of exports on 5.7% per year (DANE, 2013), Colombia faces managerial, operational and strategic problems that causes ignorance and bad decisions in aspects like knowledge of international markets, continuous improvement quality processes, and sometimes lack of capacity of production (PTP, 2014).

In addition, we have to take into account that the composition of the supply market in Colombia is given by small and medium size enterprises (SME) – only the 5% of enterprises are big ones – and they generate approximately the 76% of jobs (DANE, 2013). The principal destinations of fruit exports are USA, Netherlands, Germany, France and United Kingdom.

Keeping in mind these premises, exporting fruits and other food products come with some general and specific – depending on the country – difficulties for entrepreneurs, some examples are: fulfill quality standards and certifications requirements (Safety for consumers), phytosanitary standards, contaminants and pesticides criteria, package of the product, conservation, costs for exporting, distribution channels, price management, promotion issues, and so on. Furthermore, entrepreneurs mostly have to **know where to export and which markets they are going to target.**

In this context, the concept of quality become an important issue that companies have to care of and requires more attention due that we are talking about products that may affect health of humans. In general, quality term implies multiple definitions and we cannot give a unique meaning; for example according to Juran, he defined quality in two different ways, as a set of features that satisfy customers or as something free of deficiencies (Bisgaard, 2008).

Referring to food industry, quality can be related to food safety, governments cannot allow the entrance of products that might harm national population, products that can bring diseases, and therefore, products have to meet different standards (safety tolerance 0, information for the consumer, responsibility in the supply chain, etc.) and certifications (ISO, IFS, SQF, FSCC, OHSAS, etc.) depending on the country and the customer; for example, in the EU, exporters have to comply regulations 178/2002, 852/2004, 853/2004, and norms of maximum percentage of pesticide residues and contaminants allowed in the final product.

In fact, problems like no acquisition of quality certifications, contaminants, fertilizer residues, food additives, hygiene in transformation process are determinants to classify fruit quality (Bilska & Kowalski, 2014). Consequently, we can realize that to having high quality products not depends only on the company that transforms the product, it depends also, of all the actors involved in the supply chain, from the beginning of it, from the raw materials (Urbaniak, 2015). According to the program of productive transformation (2014) the supply chain of fruits and vegetables sector in Colombia is shaped in 4 different steps: 1) Production, 2) Post Harvest, 3) Processing and transformation; 4) Logistics and distribution (PTP, 2014. See Annex 1).

Colombia has for example, a successful case of implementing programs to improve quality in fruits, the Cape gooseberry case. This fruit in 1980s was recognized as one of the “promising fruits” that will diversify exports of Colombia and was promoted by PROEXPORT – an organism that helps companies to develop and execute export projects–; with this initiative, the Colombian government implemented training programs focusing on good manufacturing practices, established technical norms about specifications and packages of cape gooseberries, implemented a strategic plan to develop the competitiveness in the international markets, promoted the cooperation between Colombian, US and Japan bodies in order to obtain their approval of having fruits of quality and studies for possible cape gooseberry processed products; additionally, producers made a vertical integration to get cost reduction (Pineiro, 2007)

Despite of having success by achieving the desired state of high quality in some fruits like banana and cape gooseberry, SME have lots of difficulties facing the problems mentioned before – it is important to clarify that fruits from Colombia cannot harm humans, the fruits produced by this country are approved for human consumption – that’s because businessman of fruits companies only comply with the necessary requirements, **only care about the management of quality in the final product and not in the whole process, they don’t go further, they do not apply processes of continuous improvement (Quality management) like:** a) Six Sigma, get zero deficiencies in overall processes by control and corrective actions (Todorut, Cirnu & Niculescu, 2009), b) Juran quality theory, companies must plan, control and improve quality in each task developed by them (Juran, 1989), c) Deming theory, companies must create the necessity

of managing quality, they control processes and there is a special team dedicated to improve quality (Singh, Wee & Chee, 2013), d) other management systems described in the text.

In this context, some questions can be raised: Which are the processes underlying quality management? Which method is more convenient for food companies? In which part of the supply chain we can find quality problems and how companies can manage it? How to combine efficiently product quality management and export?

In the next work, the purpose is to present quality main definitions or approaches, methods of improving quality, present the relation between export and quality, a practical study in a specific company, establishing which method is the best one to apply in fruit companies and a general discussion of the results of the study.

III. Literature Review

a. Quality management theories

Over the last few decades, companies have been more interested and engaged in the satisfaction of their customers by improving the quality of their products and services. This phenomenon has become globally recognized and an important factor to determine which company is committed to development and care of the society. On the other hand, customers are more concerned about what and to who they buy products and services, they are willing to pay more if they can receive a high quality product that will not harm them.

In this regard, the quality of a product is that really matters, it can be considered as one of the most important factors for success in a market (Bilska & Kowalski, 2014). Quality is a broad term that has been studied extensively, so in consequence, it has lots of definitions and this definition depends on the point of view of the person that is defining it, in other words, quality is not the same for customers than for suppliers or enterprises, the concept meaning depends on each one's perception and it will be explained below.

It can be identified five different approaches of quality: the transcendent approach, product based approach, user based approach, manufacturing based approach and value based approach (Garvin, 1984). Firstly, according to philosophers – transcendental approach – quality can be seen as a synonym of innate excellence (Something that is natural), is a mark of uncompromising standards and high achievement (Garvin, 1984); for example, Plato said that quality is a certain degree of perfection and Lao Tsu was convinced that quality can be constantly improved (Bilska & Kowalski, 2014).

Secondly, for economists – product based approach – quality of a product is the quantity of attributes that it contains, is costly for companies and is an inherent characteristic. Thirdly, from customers view, the products that have the highest quality are those that best satisfy their requirements, their necessities (Garvin, 1989); some authors agree with this last statement, both Juran and Crosby mention that the degree in which a product satisfy clients and comply with their requirements will have higher quality (Bilska & Kowalski, 2014).

Fourth, the manufacture based approach told us that a product can have high quality if it comply with all the standards or acceptable limits of production, taking care of not doing something wrong; and in contrast to the economists, managers see the improvement of quality as a technique for cost reduction. Fifth, the value based approach define quality of a product as a degree of excellence that a company can offer at an acceptable price and cost of production (Garvin, 1989).

In this regard, companies look to reduce costs but are also committed to offer high quality goods; this challenge is faced by a huge number of commodities companies and of course by food companies. According to Moore (2014), nowadays, because of the increasing concerns and changes on behavior of consumers and retailers, food and beverages manufactures have to address both, costs and quality. Also, it is necessary to add that, for food companies, quality issue go beyond the compliment of standards or requirements in the production process, in this sector, customers have a high degree of influence because quality of a food product influences directly quality of the human life (Kowalska, 2011), in other words, customers are more aware of what they buy to eat, they want to eat something healthy.

Additionally, Kowalska (2011) stated in her research that food and agricultural world market is investing on the development of this sector with the purpose of receive food quality advances. Furthermore, it is important to admit that the assurance of food quality problem is related to all participants in the supply chain, from farmers to final consumers and inspection authorities require that companies set up traceability in all the stages of the chain (Kowalska, 2011)

Wisniewska, (2005) defined quality of food as *“a collection of a food product features and their determinants that apply to all stages of primary production, processing and distribution of food and a consumer’s table, and that fulfill various guidelines and directives in order to meet broadly defined requirements of the consumers”*. Wisniewska (2005) also stated that features of the product can be internal (sanitary conditions, safety, attributes, expiry date, reliability and functionality) or external (methods of production, environmental aspects, brand quality certifications, costs of purchasing, availability, supplements).

1. Improvement of food quality

In obedience to Bilska & Kowalski (2014), two important factors that contribute to improve food quality are: safety and hygiene. Food safety can be defined as *“the entirety of conditions which need fulfillment, concerning especially: employed additives and flavorings, level of contaminants, pesticide remains, conditions of food exposure to radiation, sensory characteristics and actions which need to be taken on all the stages of production or distribution of food in order to ensure human health and living”* (Bilska & Kowalski, 2014). On the other hand, food hygiene is defined by the Codex Alimentarius as conditions and actions taken to ensure food safety and production processes (Bilska & Kowalski, 2014).

In fact, it is obligatory to comply with the requirements and standards imposed by the law in safety and hygiene factors; for handling food safety and hygiene is necessary to implement 3 basic quality management systems: Good Hygienic Practice (GHP), Good Manufacturing Practice (GMP) and Hazard Analysis and Critical Control Point (HACCP) (Bilska & Kowalski, 2014). Therefore, GHP define which practices or processes have to be executed and which conditions

have to be followed in each stage of the supply chain to assure health safety of food, like disinfection of production machines or endowment of employees (Bilska & Kowalski, 2014).

GMP is a basic tool used by companies with the objective of produce safe goods for human consumption, this tool design and, establish conditions and procedures that have to be executed by companies in reference to infrastructure and resources, for example, the company cannot be located in a floodplain or places with different odors, with excess of smoke, powder, gases and radiation that might affect quality of the product (Industria Alimenticia, 2013). Likewise, Sharaf (2015) mention that “*GMP requirements are rigorous with respect to documentation of manufacturing operations and the evaluation, analysis and release of finished products*”.

HACCP is a method of evaluation implemented just in the food industry for assuring food safety. At the present time, this method has to be considered and implemented on all the supply chain, from the farmer, to chemical supplier and other actors that contribute to the process of production (Monreal, 2012). Its principal purpose is hazard identification and control to prevent problems related to health quality, hygiene and safety; what is more, HACCP is contemplated as one of the most important method in the industry because it assure that food is not contaminated and is safe for the consumer (Bilska & Kowalski, 2014). HACCP has been based on Juran and Deming theories (Fread, 2012).

2. Non-Obligatory quality management systems

Keeping in mind the three obligatory basic types of quality management, it can be mentioned that to implement other quality management systems that are non-obligatory for companies, it is necessary that companies have implemented already GMP, GHP and HACCP; companies must have to consider and implement one of them (Bilska & Kowalski, 2014). Regarding that quality is something that has to be continuously improved, food and agricultural companies should not stop with the compliment of some requirements and certifications, they have the opportunity to go further and engage one of the next methods, these methods are recognized by different authorities and well-known between enterprises.

The idea to manage quality appears in the 20's and one of the principal exponents of this was Juran. Bisgaard (2008) stated that Juran defined the quality of a product as an aggregate of attributes that solve customer problems and satisfy them, also, that he developed the most fundamental theory of quality, "cost of quality", this theory makes emphasis on the sum of all the costs that would not exist if companies had no problems of quality. The legacy of Juran recalls on *the trilogy*: quality planning, quality control and quality improvement Bisgaard (2008).

Juran (1989) declares that for having high quality goods companies have to become experts on planning; companies have to design all the products according to the features and specifications provided by the customers, develop processes that have the capacity to make that designed product,



Graphic 1: Juran's Trilogy (Source: Bisgaard, 2008)

develop metrics and control mechanisms through the processes – inspection and testing – and evaluate final outcomes.

Additionally, for quality of products improvement, companies must invest on adequate infrastructure and be aware of the results of evaluations because that will lead companies to correct errors in the processes, to be inside the limits, avoid deficiencies and boost quality of both, processes and the finished product (Bisgaard, 2008). In the graphic 1, we can see illustrated this methodology.

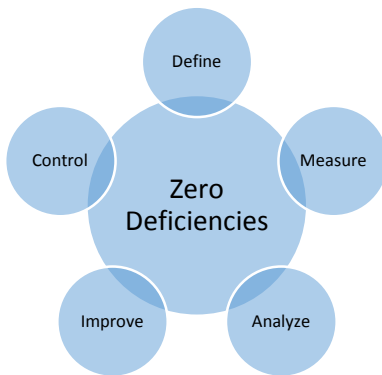
Another principal exponent on quality management systems was Deming with his 14 points. The main ideas of Deming Management Method are that for achieve continuous improvement of quality in products, it is necessary to create awareness in the entire company about the existing necessity of improvement; create a team to manage quality; cease dependency on mass inspection; eliminate quotas of production; find minimal errors in processes that lead to decrease quality and take corrective actions; improve and control the production processes; training supervisors and educate managers; and look for have 0 errors in order to get always high quality products and processes (Singh, Wee & Chee, 2013).



Graphic 2: Deming 14 points (Source: Deming, 2000)

For the theory of Deming is important that managers of quality get enough knowledge about all the supply chain system, statistical methods¹ that help them to measure quality, conceptual knowledge as theories and requirements or standards that will help them to define the limits of the processes, and knowledge about human resources management (Deming, 2000). In the graphic 2, we can see illustrated this methodology.

Six Sigma theory appears as another method for quality management. Six sigma is a long term practice that is focused on the improvement of processes to obtain at the end high quality products; and for obtaining that, is crucial for companies identify through each process the vital elements that lead to improvement and that will allow the company to have 3 or 4 deficient products in each and every millions of products (Todorut, Cirnu & Niculescu, 2009). For this theory, it is required a carefully selection of metrics that will control the activities taken to improve quality of the final product (Smith, 2014).



Graphic 3: Six sigma and DMAIC (Source: Thomsett, 2005)

Six sigma can be related directly to the DMAIC cycle (Define, measure, analyze, improve and control), because to implement it, companies must define which problems and which processes are interfering and decreasing quality, obtain enough information of the variables that are causing this problems, utilize statistical methods to analyze and predict the behavior

¹ From the point of view of quality, the statistical methods are techniques used by managers or engineers in a rational way to predict changes in variables and aim to reduce errors; also, it is used to minimize the quality variation of a product at a given cost of production. (Shewhart & Deming, 1939)

of these, develop plans and optimize the improvement processes and control the actions. At the end of this, products will be high quality ones; Six Sigma supervise all along the production process and not just inspect the finished product (Thomsett, 2005).

The fourth method of quality management is called, Circles of quality. According to Gray (1993) the circles of quality only provide a short term help for managing quality and they can be part of the TQM method. The QC are voluntary groups of people inside the company that develop activities control quality of products and processes, these activities are related to work environment and infrastructure of the company; the aim of this theory is that employees have to look for problems that can emerge when they are working in the development of the product and find solutions to correct them by cooperating between employees. (Ishikawa, 1985) Nevertheless, this method has been criticized because doesn't help in the long term (Gray, 1993).

Kaizen quality management theory is based on using small but incremental steps to improve the quality (Maurer, 2013). Maurer (2013), also stated that this theory uses customer approach to define quality and because of that, employees of the company must look and create every time ways to improve the processes, and consequently products quality for the satisfaction of customers by finding errors in the production and in the working environment that could affect the final product, and communicating when something small can affect the entire production or decrease the quality of the product. In addition, Kaizen method uses the 5 steps of housekeeping, and standardization to improve quality of products (Imai, 1997). The last two methodologies are strongly related with employees help; for QC and Kaizen, employees are vital for the improvement of quality of processes and products.

Total Quality Management (TQM) is not totally related to food safety but can be explained as *“Total – every person in the company is committed to broadly understood quality; Quality – customer expectations are entirely fulfilled; and Management – managers at every level, especially the highest, support and actively engage in implementing pro quality corporate culture –”* (Bilska & Kowalski, 2014). This method emphasized on the integration of the entire company to obtain high quality products; and is based on machine, material and process innovation with the objective

of modify, adjust, and deliver the right product and the safest one – some of the tools used in this type of management are Kaizen, Poka-yoke, QC, PDCA – (Taddesse & Osada, 2010).

It can be mention a last method, Theory of constrictions. TOC has been developed by Goldratt and is focused on the improvement in processes to get high quality products; the theory takes into account that everything in the company faces different restrictions that are causing problems and has to cope with those, and as a result products might have a decreased quality. Because of that, it’s necessary that managers identify all these restrictions and bottle necks that are causing bad quality products, exploit all the resources, verify how processes cope with the restrictions and control quality before doing a process, establish priorities to focus on, and improve the capabilities of processes. (Goldratt Institute, 2009)

In overall, it can be added that the methods explained before help companies not only to offer high quality products but also to reduce operational and administrative costs, enhance employee participation, increase capabilities of the company, profitability, reliability, efficiency and productivity, and a change of organizational culture; The most important similarity is that all the systems agree that for having high quality products is necessary to have high quality processes. (Juran, 1989; Deming, 2000; Ishikawa, 1985; Imai, 1997; Goldratt Institute, 2009; Thomsett, 2005). In the next table is summarized the different methods or systems studied before.

Quality Management System	Author	Objective	Principal Ideas	Benefits
Trylogy of Juran	Juran	To achieve products with lots of features and minimal deficiencies and to organize quality management within the company. Achieve continuous improvement.	<ul style="list-style-type: none"> ✚ Quality planning: Process in which companies develop updates of existing products or new ones to remain competitive. ✚ Quality control: Process in which companies chose what has to be controlled, where and how. Company stablish measures, standards of performance and evaluate the outcomes. ✚ Quality improvement: Process in which companies stablish the infrastructure and methods required to improve processes, diagnose damages to the system and find solutions to problems. 	<ul style="list-style-type: none"> • Minimize dissatisfaction of customers. • Cost reduction. • Optimization of company performance. • Efficiency and profitability.

			This is a cyclic and continuous process.	
14 Points Deming	Deming	To develop profound knowledge, to respond to failures and to be more effective. Achieve continuous improvement.	<ul style="list-style-type: none"> ✚ Creation of awareness in the entire company of the necessity to improve products and processes. ✚ Eliminate mass inspection. ✚ Training employees and educate managers ✚ Manager and team of quality with enough knowledge of all the systems of the company. ✚ Achieve 0 errors in processes and products. 	<ul style="list-style-type: none"> • Offer products with 0 deficiencies. • Optimization of processes of production. • Change of organizational culture, some independence of employees. • Shared vision • Cost Reduction and profitability.
Six Sigma	System developed by Motorola	To obtain high quality products by eliminating deficiencies.	<ul style="list-style-type: none"> ✚ Establishing different work teams that will assess each process and create the improvements to follow in each process. ✚ Establish different metrics to control tasks and activities through the company and find corrective method and actions when deficiencies are found. ✚ Define, measure, analyze, improve and control. ✚ Supervision of each process of production and inspection of the final product. ✚ Customer needs and requirements are used to develop improvements, 	<ul style="list-style-type: none"> • Improve customer satisfaction. • Optimization of processes. • Cost savings. • Efficiency and profitability.
Quality Circles	Kaoru Ishikawa	To achieve high quality processes and products. Achieve continuous improvement.	<ul style="list-style-type: none"> ✚ Encouraging employees to find errors in their working places and find solutions to correct them. ✚ Develop activities to control processes and products quality. ✚ Short-term approach. ✚ Can be used as a complementary quality system management. 	<ul style="list-style-type: none"> • Continuous learning. • Employee participation and motivation. • Increased productivity. • Team work. • Optimization of processed. • Reduction of costs by finding errors.
Kaizen	Masaaki Imai	To continuously improve processes and optimize them to achieve high quality in the overall system.	<ul style="list-style-type: none"> • Employees must create new ways to improve each process and product quality. • Employees must identify errors through the company that have to be overcome. • To work properly employees have to eliminate unnecessary resources, pointless searching and clean the workplace. 	<ul style="list-style-type: none"> • Employees' participation and satisfaction. • Customers' satisfaction. • Optimization of processes. • Efficiency.
TQM	Uncertain Origin	To achieve continuous improvement by eliminating useless processes and to satisfy	<ul style="list-style-type: none"> ✚ Tools used: Quality circles, PDCA cycle, Poka.Yoke, Kaizen. ✚ Create work groups to find deficiencies in a process. 	<ul style="list-style-type: none"> ✚ Reliability and profitability. ✚ Reduction of costs. ✚ Employee participation.

		customers in every possible way.	<ul style="list-style-type: none"> ✚ Create new ways to solve problems and correct errors. ✚ Obtain information from employees work experiences and data collected from control check-points. 	<ul style="list-style-type: none"> ✚ Efficiency. ✚ Customer satisfaction. ✚ Enhance company processes.
TOC	Eliyahu Goldratt	To find bottle necks in the company processes and improve quality of end products.	<ul style="list-style-type: none"> ✚ There is existence of different restrictions that cause problems and harm the system. ✚ Develop methods or tasks to identify restrictions. ✚ Reallocation and exploitation of resources effectively. ✚ Develop methods to control and monitor restrictions. ✚ Quality control before going into the next process. ✚ Stablish priorities. 	<ul style="list-style-type: none"> ✚ Cost reduction. ✚ Reliability and profitability. ✚ Effective use of resources. ✚ Increase company capabilities.

Table 1: Summary of methodologies

Source: Self-constructed with information of (Juran, 1989; Deming, 2000; Ishikawa, 1985; Imai, 1997; Goldratt Institute, 2009; Thomsett, 2005).

3. Management of suppliers to improve product quality

In this study is necessary to mention that there is a strong relationship between suppliers’ management and management of product quality. Ishikawa (1985) in his text “What is total quality control?” stated that suppliers influences in a high level the quality of the final product; that’s because they are in charge of performing their own quality control over raw materials and specific products needed for the production.

To implement a successful management system of product quality, companies must start managing suppliers who provide the raw materials and other key products needed for production; in other words, companies have to assure quality and safety of products even before buying products to the selected supplier and has to do a continuous surveillance of the supplier. Keeping in mind this, quality management team or the person in charge of quality has to make a research of key information per each supplier, such as, regulatory compliance, which quality management system they use, how they improve quality or which are the actions that the supplier take to prevent or correct deficiencies, capacity to comply with established requirements (Condrea, Constandache & Stanciu, 2008). Urbaniak (2015) stated on his text that the continuous monitoring and measurement of activities of suppliers have to be done with indicators related to the quality of

products and by doing audits only for verification of compliance with legal and organizational standards requirements.

In this regard, it's important to build long-term relationships with suppliers because that can lead to different mutual benefits, for example, improving product quality and service, shorten order fulfillment cycles, increase efficiencies, cost reductions, improve communication or joint research and development (Urbaniak, 2015). Additionally, there has to be a relationship of trust and cooperation between buyer and supplier; and to improve products quality it is necessary that: each one has to be responsible to implement a quality control system, a continuous communication between partners, buyer has to submit all the requirements in reference with the wanted product, supplier has to guarantee quality before delivering products, work together to find out a new and better quality management system for both companies, make a contract of processes to solve problems and mainly, watch out interests and attitudes of consumers (Ishikawa, 1985)

Another possibility to improve products quality is supporting the supplier; it can happen when the company had established a quality management system and knows how these systems works. Company can offer assistance to the supplier in the form of consulting and training in quality management or improvement and can lead to a win-win partnership; in one side, company get the products with his requirements and standards, on the other side, supplier can get the benefits of implementing a system of quality management (Urbaniak, 2015).

4. Quality and exports relationship

First of all, it is important to make emphasis in the relation between the price and the quality of a product or service. In accordance with Vandebussche (2014) quality of a good the majority of times represents a shift on prices and hence, on the demand curve; when a high quality product results in a higher price, appears a higher willingness of customers to pay for that product and not to buy the low quality product, but when prices of goods don't vary, high quality goods still have higher market share.

Secondly, it is necessary to define the term export. According to Castro (2008) export is the output of a product of a particular country to another one, crossing the different borders or seas that separate nations; there are different export modalities that are based mostly in the type of products and the importance of this modalities vary from one country to another.

Keeping in mind this, we can go further and realize that the relation of quality and prices exist not only in a determined industry or sector of a country, it exists between two or more negotiating countries. A part of the study carried by Hallak and Schott in 2011 about cross-country differences in product quality, show an existing relationship between volume of exports and quality of exported products.

Hallak & Schott (2011) find out that customers care about price and its relation to quality when doing a purchase decision, that two countries with equal prices when exporting but different trade balances have products with different quality levels, in other words, that the country with higher trade activity possess higher product quality. Moreover, Vandebussche (2014) stated that quality is an important determinant to assess the firm's competitiveness and when the consumer recognizes a high quality product, he or she might be willing to pay established price; this concern of quality vary from one country to another, for example, in France and Italy, customers are more in favor of higher quality goods than Germany.

To summarize, QUALITY factor affects in an undetermined level the trade volume, exports and imports; and despite that there is no too much studies of the relation between quality and export, the relation between prices and quality can explain it slightly.

IV. Study

1. Methodology

The selected country to study was Colombia, this one, is a developing country located in South America that has improved his economic performance over the last decade and for being one of the largest coal and oil producers, its economy mostly depends on mineral and energy sector. Few years ago, government and economic actors began promoting free trade agreements, alliances and

new policies with the purpose of gaining progressively international recognition as one of the best economies in Latin America, and to maintain a sustained economic development. Nevertheless, to reach this objective, Colombia has to face challenges in decreasing poverty and inequity rates, improvement of infrastructure and better management practices (PTP, 2014).

Additionally, Colombia is a tropical country that has access to Pacific Ocean and Caribbean Sea, has approximately 836 airports, 3 heliports, 874 km of railways, thousands of kilometers of pipelines, 141.374 km of roadways and 18.300 km of waterways navigable; the country has 5 seaports, 1 river port and 1 oil terminal (CIA, 2013).

Nowadays, all the actors engaged in the economic development of the country (Government, enterprises, researchers, etc.) have planned different national programs to accelerate productivity and competitiveness, and aimed to increase exports on 20 different sectors that transform the country: cosmetics; publishing and graphic communication; vehicle industry, textile industry, metalworking industry; steel industry; shipyard; energetic industry; outsourcing and BPO processes; health tourism; nature tourism; wellness tourism; **fruits and vegetables sector**; palm, oil, vegetable fats and biofuels; beef industry; raw materials industry; leather and footwear, IT's; aquaculture; and dairy sector (PTP, 2014).

In this regard, we will focus on fruits and vegetables sector. Colombia is one of the countries that can increase the use of agricultural lands each year because counts with approximately 14 million hectares; the country is using almost the 30% of this hectares adequately. All these land hectares has different compositions and are located in different climate zones that allows cultivate and have production all 12 months (PROCOLOMBIA, 2014). For the sector mentioned before, the country counts with 940.000 hectares available with an annual growth of 2.4%, and we must say that 70% of those hectares are for fruit crops and 30% for vegetables crops (Flórez, 2013).

Furthermore, according to the Food and Agriculture Organization of the UN, Colombia is the third Latin-American country with more cultivated hectares of fruits and the fifth producer with a participation of 7.2% (FAO, 2013). Colombia is capable to produce 95 different types of fruits including native ones and fruits from other continents, like banana, citric fruits, papaya, borjój,

avocado, mango, pineapple, lemon, maracuya, strawberry, mangosteen, pitaya, and so on (Colombia Trade, 2014). It's necessary to take into account that the sector has a growing average of 5.7% per year (DANE, 2013), and its principal opportunities to increase exports are: for fresh fruits, Canada, Venezuela, France, Suede and Japan; for exotic fruits, UK, Portugal, Germany and Netherlands; and for processed fruits, Switzerland, Suede, Russia and Turkey (Colombia Trade, 2014). (See Annex 2 for further information)

Some experts of the national development program states that Colombia faces managerial, operational and strategic problems that causes ignorance in aspects like knowledge of international markets, continuous improvement quality processes, and sometimes lack of capacity of production (PTP, 2012). The country is compounded majority by SMEs firms and its managers relay lots of times in lack of knowledge of managerial aspects; for example, regarding to quality issues, managers think that comply only with requirements it's enough, companies doesn't implement types of quality management like 14 points of Deming; or regarding to the ignorance of export benefits, Rodríguez (2003) confirms that over 50% of entrepreneurs think that access to foreign markets does not at all affect form development and only 25% consider that going international is somewhat important to boost the firms.

Taking into account the country information we proceed to the selection of the company to develop the case study. First of all, for select the correct company, a searching process has been made through different fruit companies in Colombia, the criteria of absolute incompatibility for selection in this study is: Companies that has applied and implemented some quality policies and that communicate it to the stakeholders; this criterion has been used as a filter and as a result, it was possible to find 10 possible companies. Second, it has been used other filters like: size of the enterprise, level of engagement in quality aspects, export potential and the amount of data that can be collected through secondary sources.

The selected company was FrutiHelen SAS. Frutihelen is a Colombian company responsible for processing and trading different variety of fruits. The company comply with the requirements mentioned before. According to the classification of companies of the national bank of Colombia (2014), the company is small size one; and according to the information provided by the company

in their mission and vision, they are committed with the development of high quality for both, international and national markets. The idea is to study how they manage quality in their products of fruits and which quality management system could fit in the company and why they can be potential regular exporters.

2. Case Study: FrutiHelen

i. Company overview and projection

The company was founded the 15th of March in 1994 as Fritihelen Ltda.; over the years the company has changed of location two times, the main reasons were renting contracts and infrastructure problems. In the first location, the company had a low capacity of production and its products were completely artisanal made; six years later, the company has been translated to a different location that lets them increase their production capacity and they were able to export for the first time.

Since 2006, the company is located in Yumbo-Acopi, Colombia; Frutihelen had reshuffled this warehouse, turning it in the wanted plant of production. The company in 2008, motivated by the growth and the requirements of certifications that the public sector imposed, had invested on high technology machinery for processing their products. Also, they change their registered name to Frutihelen SAS. Additionally, it is important to mention that the company is linked in a national exporting program (Expopyme-Proexport) and was able to participate in different trade fairs. Their main customers are supermarkets, restaurants, institutional enterprises, industrial enterprises and social clubs.

The principal objective of the company is to create an added value to the product that the company offer by adding vitamins, small pieces of fruit, natural sweetness and different additional flavors like coco and mint without compromising the quality of the products; and their vision is to be recognized in 2018 as a leader, competitive and innovative company in the processing and merchandizing of healthy products extracted from fruits in a national and international level.

Frutihelen is committed to improve their performance and productivity, reduce costs and offer a high quality product that will be recognized by all their clients and a product that can attract new customers. Taking into account this information, the aspirations of the company and the changes on customers concerns, it is necessary to analyze deeper quality management in this company.

ii. **Quality management analysis of Frutihelen**

Regarding to product quality management, there are key factors to analyze based on the research: production process and management of suppliers, compliance of quality certifications and compliance of quality objectives.

 *Quality Policy and objectives*

Frutihelen SAS is committed with the opportune and complete delivery of excellent quality products with competitive prices. To achieve this, the company counts with appropriate infrastructure and, a competent and motivated work team that search the continuous improvement of company processes, ensuring customers' satisfaction and organizations sustainability.

Because of this policy, the company has set six different quality objectives:

- I. Satisfy customers with the opportune and complete delivery of high quality products.
- II. Maintain and improve the infrastructure of the company.
- III. Improve employees' performance.
- IV. Improve process of the company.
- V. Improve level of customer satisfaction.
- VI. Assure sustainability of the organization.

Keeping in mind the information mentioned before, in comparison with the quality management systems and according to the pioneer of this field, Juran, the company is in the right way to achieve continuous improvement of quality because according to him planning is the first step that

companies must take, with this policy and objectives, the company knows where they want to be and how they are going to achieve it.

In addition, making reference to all the systems, it is correct that the company focus their actions towards the satisfaction of all the requirements of the customers because that is the principal purpose of managing quality; also, when the company take into account the improvement of processes is clear their commitment to quality because according to different theories, as six sigma, kaizen, TOC, etc, this is one of the main steps that companies have to take and care of to get high quality products at the end.

Additionally, the company to assure quality of their final products has established management indicators in their processes with the purpose of measure the performance and demonstrate the capacity that they have to achieve expected results; the company ensure that the analysis of data by statistic methods will guarantee the effective compliment of customers' requirements. These measurements are used to evaluate and control operations day per day, looking for some possible significantly improvements and corrective or preventive actions.

Despite that this initiative is one of the main steps that companies have to take to improve quality, there is the existence of one error, evaluating and control day per day is not enough to get high quality processes and hence, high quality products. Theories like six sigma and Kaizen recommend to evaluate and control during each process, at the moment, when the process seems wrong, employees have to be analyzing, correcting and controlling according the established standards and prevent any error that can occur; not correct it when it already happened and affected other processes.

Certifications and quality management systems implemented by Frutihelen

The company Frutihelen, as we can see in the chart, has obtained three different certifications and has implemented one quality management system.

Certifications (Colombia)	Quality Management System
Ordinance 3075:1997 and resolution 2674:2013 of Good Manufactures Practice.	GMP
Resolution 3929:2013 Sanitary requirements of fruits and derivate.	
Resolution 4596:2013 Maximum levels of contaminants on fruits.	

Table 2: *Quality Management in Frutihelen*

Regarding to the system that they have implemented and in contrast with the literature, they just have implemented one out of three obligatory quality management systems that different governments require, they don't have GHP and HACCP certifications, this lack of obligatory systems makes more difficult the implementation of a non-obligatory system because those three methods are the first small steps to have a continuous improvement of quality through the company. As a consequence, we can realize that they don't have an established management system, they have set objectives and try to achieve them by training programs and using some statistical methods to ensure quality; the company don't mention which statistics methods they use.

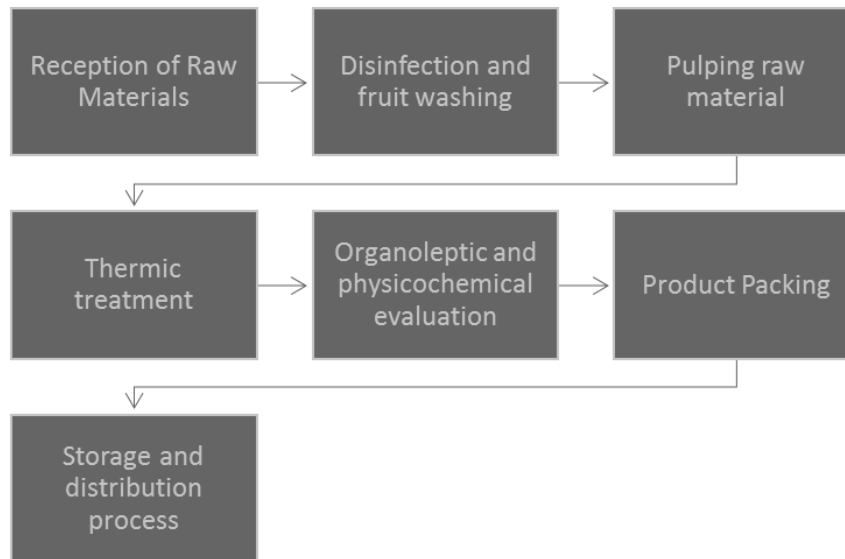
Production process and suppliers management

First of all, one of the most important factors that determine quality of a food product is hygiene. In Frutihelen by implementing different processes they want ensure that the conditions for production are adequate according to regulation, and are safe to produce goods for human consumption; every day before entering into the plant, each employee has to follow a stablished washing and disinfection process, they have to dress working clothes and tools; then, before the beginning of production process, some employees have to do a sprinkling, cleaning and disinfection on machines and production areas.

It is clear that the company comply with some of the requirements regarding to the hygiene factor because as we mention before they have implemented GMP. Nevertheless, the lack of

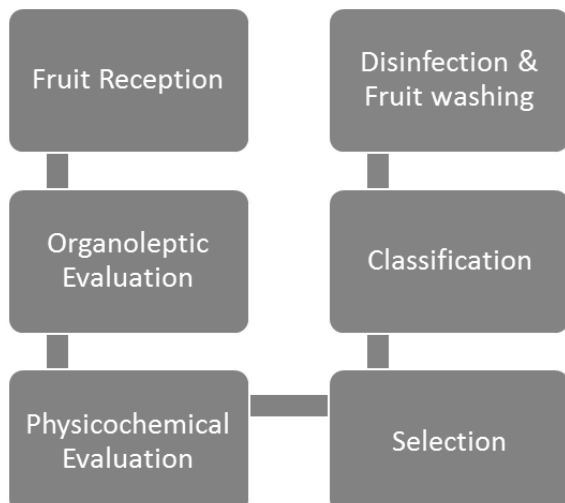
implementation of GHP and HACCP can be a threat for the company when trying to export because those practices are obligatory and required for different governments around the world.

Secondly, for analyzing quality management it is necessary to focus on the production process of Frutihelen. This process can be classified in seven different steps and is illustrated in the graphic 1.



Graphic 4: Production Process of Frutihelen (Source: Frutihelen, 2014)

In the graphic 2 is illustrated the sub-processes of step number 1, reception of raw materials. Employees that are in charge of receiving the raw material, in this case the fruits, have to do an



Graphic 5: Subprocesses of Step 1 (Source: Frutihelen, 2014)

organoleptic and physicochemical evaluation that requires different resources – time, human capital and money – and then classify them to begin the process of production.

Despite that it is true that quality evaluation has to be made in every step of production process, in this step is an unnecessary cost. According to Ishikawa, the cost of evaluating quality of raw materials can be avoided when the company had built a trustworthy relationship with the suppliers

because it is supposed that they are in charge of providing to the company high quality products, they are responsible of doing quality assessment at the end of their process before delivering it in obedience to the requirements that the buyer has established.

Referring to the next three steps in the production process of Frutihelen: disinfection and fruit washing, pulping raw material and thermic treatment; it should be mentioned that these three are made by high technology machines, employees have to configure the machines in accordance with predetermined standards such as volume of disinfectant, volume of water, water jet force, amount of chemical elements or pasteurization temperature. However, employees are in charge of doing other tasks at the same moment and as a consequence the processes are partially monitored and evaluated. Also, it can be mentioned that the process are made completely automatically.

Because of that, the company is risking the whole production due to the partial surveillance, an error can occur while the employee is concentrating in another task. In contrast, there is what quality management systems recommend, authors like Juran or Deming make emphasis on surveillance and monitoring standards and criteria before the start of each process, that situation can lead to find minimal errors and to improve the quality of the final product, moreover when the processes are automatically made. Additionally, Kaizen stated that finding this errors can help employees to find or create new ways to improve the entire process.

The continuous surveillance can lead to reduce costs in many different ways, for example, if the incorrect amount of chemical elements was added by error by the automatic machine and there is no one supervising the process, the whole production will be lost and the process has to be made one more time, increasing the costs by wasting time, space, human capital and new resources.

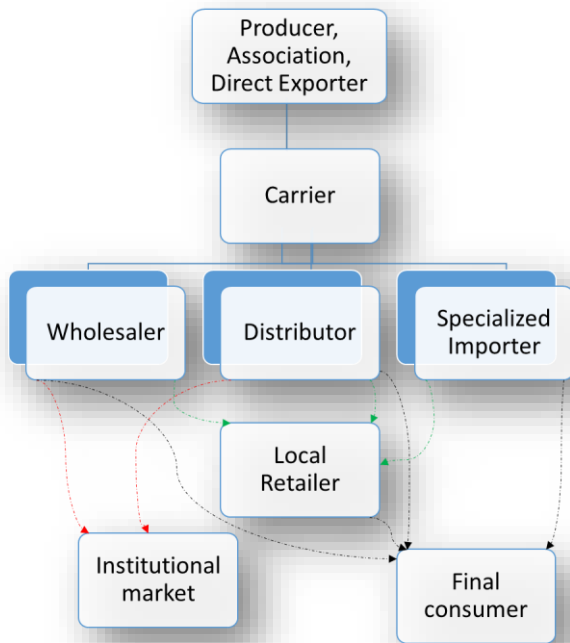
After the 5th step of the process, organoleptic and physicochemical evaluation of the product to assure that the product is safe to human consumption and is high quality one, employees begin with product packaging process; in this step, some employees use a graduated machine to fill plastic bags and bottles. Nonetheless, according to the process map there is no existence of one last quality assessment that evaluate the reaction between of the product and the packing component before doing the entire process, in other words, if the packing component with his

qualities affect the quality of the final product. In accordance with all the quality management systems, a final inspection has to be made to know if all the requirements of the customers are fulfilled or not; this inspection gives to the company real data to find possible errors that can be avoided or corrected immediately.

On the other hand, about suppliers' management, there is no information about this point. There is no evidence of which are their suppliers and/or the evaluation criteria to establish long-term and transparent relationships with them. According to the literature, management of the suppliers are a key factor to assess quality from the beginning of the value chain, being aware of how suppliers evaluate quality of their products and if they are also transparent in all their processes help the buyer to reduce costs and to ward off mass inspection of raw materials.

iii. Export Program and the company

Proexport is an organization in Colombia that help companies to export by providing them a guidelines and possible options to where export or not; these programs are specially directed to small and medium enterprises. In the graphic 3, we can see the possible channels of distribution.



Graphic 6: Distribution channels in Fruit Sector

According to the Colombian legislation, companies can be micro-enterprises when they have from 0 to 10 employees, small enterprises when they have between 11 and 50 workers and can be medium enterprises when they have from 51 to 200 employees. Nowadays, Frutihelen is on Proexport program, as a small company they can participate; because of this program, the company was able to be part of some national and international fairs, giving them the opportunity to open new course and to internationalize.

However, the company doesn't provide information about their export activities but with news it was possible to know that they are not a regular exporter and that they participate in other local programs to improve the quality of their products and begin to export in a regular manner.

Taking into account that the company is putting some effort on quality issues before exporting, it is a good sign because company is preparing himself towards international pressures and environment by giving high quality products, and as we can remind from literature, high quality final products have higher opportunity to be purchased by customers around the world. As an example, it can be mentioned the case of Ocati, Ocati is a fruit company that because of the label of high quality products acquired have increased their exports and in general their sales.

V. Conclusion

To summarise, we found that the main processes underlying quality management are planning, improvement and control processes. Theories like Juran trilogy, 12 Deming points, Kaizen theory, six sigma, circles of quality, TQM, TOC, and so on, have in common the objective of improve quality based in the compliance of customers requirements and necessities, each method is different from the other and companies can combine or use just one of them. In the food industry due to the existence of obligatory quality management systems (GMP, GHP, HACCP), it could be recommended the combination of three theories, Juran's trilogy because of its relation with HACCP, Kaizen theory because it's important to improve quality in every process with small steps but incremental ones, and Ishikawa theories regarding to suppliers quality management, because as we described before, quality of a final product has to be managed through the supply chain.

In this point, according to our research it was possible to prove that the quality management has to be addressed even before beginning the production process, the lack of management of suppliers in quality aspects affects the entire supply chain and as a result the final product, because of that companies must manage their relationships with their suppliers and clarify all the standards and requirements that the raw material has to meet, suppliers and customers have to work together, trust each other and help each other.

Taking into account this information, in the case study, we can see that Frutihelen is in the first steps of implementing successfully quality management systems. The company has implemented some tools used to manage quality in companies, has acquired different quality certifications, but they should work on the implementation of GHP and HACCP; and define and structure the non-obligatory quality management system. At the same time, they have to begin to manage the relationship with their suppliers to assure quality since the beginning of the supply chain, they don't provide enough information about their suppliers, decreasing the transparency status with the stakeholders. By doing this study, we can state that in the case of Colombian small and medium enterprises, it can be mentioned that the majority has implemented tools regarding quality management but is not enough.

Additionally, it was possible to identify the relation between quality and exports. This relation has begun to be more significantly but still a little weak. However, the relation is a positive one, more quality can result in a slightly increment on exports, as a reference we have the big company called Ocati. So, it is up to Frutihelen and other SME's that have aspirations to reach international markets to engage quality management systems.

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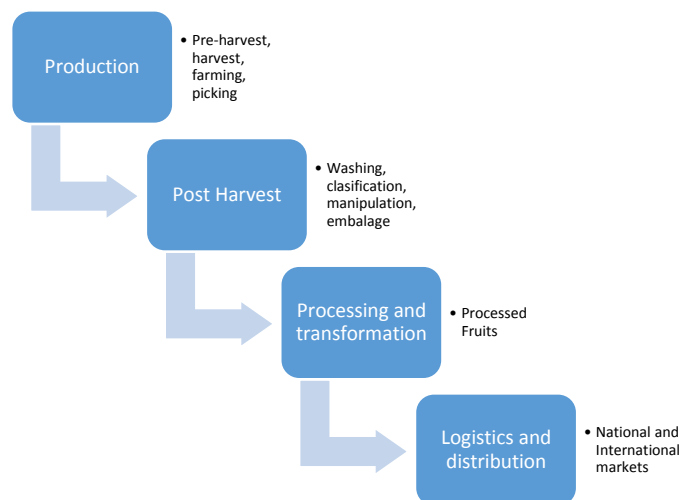
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VII. Apendix

Annex 1

The sector of fruits and vegetables supply chain has 4 echelon as we can see in the diagram. Additionally to this, this sector has 3 different types of suppliers: those that provide inputs or raw materials like seeds, lands rental, packing tools, pesticides, fertilizes, industrial accessories, chemical products for cleaning; those that provide the equipment and machinery; and those that provide services like subcontracting, interior transportation, laboratories, consultants, banks, insurances, energy, water, marketing, commercialization, international transportation. (PTP, 2013)



Source: Diagram built from information of PTP (2013) World Wide Web: <https://www.ptp.com.co/categoria/sectorhortofruticola.aspx>

Annex 2

YEAR	2011	2012	2013	2014	Total
GEOGRAPHIC ZONE					
TRANSPORT METHOD					
SUBSECTOR					
AFRICA	\$641.811,30	\$224.550,55	\$36.961,64	\$10.941,20	\$914.264,69
CENTRAL AMERICA	\$5.499.998,46	\$1.695.397,52	\$1.677.323,60	\$1.799.900,40	\$10.672.619,98
NORTH AMERICA	\$29.347.411,45	\$29.711.317,29	\$34.992.632,39	\$30.207.884,28	\$124.259.245,41
SOUTH AMERICA	\$13.222.232,77	\$12.316.157,32	\$10.398.587,92	\$7.926.453,02	\$43.863.431,03
ASIA	\$5.188.265,16	\$3.901.579,43	\$3.283.464,94	\$2.198.764,58	\$14.572.074,11
CARIBE	\$4.837.829,07	\$4.046.619,98	\$4.292.103,98	\$5.231.047,82	\$18.407.600,85
EUROPE	\$50.137.529,48	\$53.702.653,57	\$57.851.834,01	\$53.115.541,01	\$214.807.558,07
BY SEA	\$44.269.080,85	\$47.370.100,21	\$51.250.471,84	\$47.068.805,83	\$189.958.458,73
FRUIT - EXCEPTION BANANA	\$35.610.458,77	\$39.071.340,86	\$41.242.714,76	\$36.532.581,51	\$152.457.095,90
PROCESSED FRUITS AND VEGETABLES	\$8.658.622,08	\$8.298.759,35	\$10.007.757,08	\$10.536.224,32	\$37.501.362,83
BY AIR	\$5.868.448,63	\$6.332.553,36	\$6.601.362,17	\$6.046.735,18	\$24.849.099,34
FRUIT - EXCEPTION BANANA	\$5.809.424,59	\$6.256.105,27	\$6.493.611,01	\$5.873.122,69	\$24.432.263,56
PROCESSED FRUITS AND VEGETABLES	\$59.024,04	\$76.448,09	\$107.751,16	\$173.612,49	\$416.835,78
OCEANIA	\$987.533,58	\$553.666,16	\$861.087,17	\$1.033.698,65	\$3.435.985,56
COLOMBIA FREE PORTS	\$3.604,64	\$1.787,73	\$148.933,10	\$122.356,45	\$276.681,92
Total	\$109.866.215,91	\$106.153.729,55	\$113.542.928,75	\$101.646.587,41	\$431.209.461,62

Source: Self constructed with data provided by the Statistical National Department of Colombia (Procolombia, 2014) World Wide Web: <http://www.procolombia.co/>